The Art of Tone Regulation

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- **What is tone regulation?**
  - Sometimes called voicing, tone regulation is the process of adjusting and modifying the tonal character of the piano.
  - Different preferences
  - Different techniques
  - Judgment: the essential ingredient. Understanding precedes voicing.
  - Steve's sad story when he voiced too much

- C**onditions prior to actual voicing**
  - Piano must be in good physical condition (pinning, glue joints, etc.)
  - Solid tuning, especially the unisons
  - Regulation must be good and even

- **Initial voicing parameters**
  - Hammer shoulders must be able to move: the shoulders must be opened up.
    - Deep needling
    - Pliers
  - Hammer shape must be good
  - Optimal strike point
    - Find the optimal strike point
      - Go to note 88 and move the action in & out to find the sweet spot.
      - Do the same thing on note 72. Make a mark.
      - If a different position is required to achieve the same tone, some of the hammers might need to be pulled off and re-glued.
      - Set the cheek blocks.
  - String terminations must be clean and solid
    - Take a close look at the bridge notching.
      - Over time the edge of the notch will be pushed down and will move out into the speaking length.
      - Some pianos have a clean steep notch and others have a curve. The strings will wear these areas.
    - Agraffes
      - The string will burrow up in the agraffe & create zings
      - Take the strings off, ream the agraffe holes, and put the strings back in. Agraffe reamers have a conical shape.
    - Capo Bar
      - Clean up the bar & restore the original shape
      - Sometimes there will be greasy stuff on the tip of the capo bar as a result of people lubricating the bearing. Be sparing when lubricating this bar.

ProTek, ProLube, Liquid Wrench, etc. work, but they will all build up and will kill the tone, particularly in the treble.
- Watch if soda pop has been spilled on the strings and collected in the capo bar

- Strings level and hammers fitted to strings
  - String adjustments
    - Level strings make a dramatic difference
    - A brass level is the most accurate method, but it takes time
      - If the string is low, use a string hook and bring the string up.
      - Darrel Fandrich invented a string hook on a dowel that leverages
  - Hammer-to-string
      - Put the finger joint on the tip of the jack hammer and move he finger up to block the hammer on the string. Hold the hammer against the string and pluck each wire. They should all be muted.
      - Compare the hammer shape to the string positions.

- **General Methodology**
  - Voicing for brilliance & power
      - We are looking for a color change from soft to loud
      - All work from previous sections improve power and/or brilliance
      - More filing
        - Fine sandpaper can add a little bite
        - Filing can add brilliance
      - Chemicals
        - lacquer solution
        - white shellac
        - collodian
  - Voicing for mellowness or softness of tone
      - Needling in upper shoulders and/or crown
      - Steam
      - Chemicals
  - Needling Techniques
      - Use three short needles.
      - This is time-consuming
      - Needles cut fibers and are more destructive to the felt.
      - Needles can break off.
      - Squeeze the sides of the hammers with vice grips.
      - The width can be pre-set.
      - This technique is fast.
      - Don’t squeeze the treble.
  - Filing Techniques: hammer shape must be good
      - Paddles vs. strips
        - Paddles are less consistent and take longer.
        - Using a strip, a set of hammers can be filed in thirty minutes
        - Straight hammers

- Strips
    - Start with 60 grit strips, 3-hammers wide
    - Anchor the strip low on the shoulder with the finger tips and pull about ten strokes
    - Over the top do one or maybe two strokes
    - The upper back shoulder is no longer anchored with the fingertips
    - Put fingertips on the middle of the back of the hammer and file off the remainder of the felt.
    - Angled hammers must be done one at a time.
    - Do the fronts all from one direction to the other
    - Go in the opposite direction on the backs because of the angle
- Basic rules
    - Don't fully remove the string grooves: leave a trace
    - Creates more work for yourself
    - Can't see where the strings go
    - Keep them all looking even

- Voicing for Evenness with **Hard-Pressed Hammers**
    - Begin voicing for evenness by playing each key hard (ff) and listening for harshness. If harshness is present, mark the key and needle deep in mid-to-upper shoulders, finding hard spots.
    - Continue by playing each key at mf. Shallower needling in upper shoulders.
    - Continue by playing each key softly. Use sugar-coater for color.
    - Voice in the shift position
    - Listen to each string separately
    - Needle either between the grooves or on the offending grooves, depending on whether the shift is set to miss the left string or not.
    - Use a single needle.
    - Sometimes a quick swipe of the sanding file diagonally across the left corner of the crown will help if that area is hard.
    - Place carbon paper on the hammers
    - Voice with a single needle in the shift position by listening to each string separately and needling with a single needle between the grooves as needed.
    - Voicing at low dynamic levels is much more important than voicing at high dynamic levels.

- Voicing for Evenness with **Soft-Pressed Hammers**
    - For soft-pressed hammers (Ronson, Steinway) the shoulders need to be lacquered and made more firm. At least the top half of the hammer must be soaked.
    - Mark string lines if grooves are not developed

- Begin by voicing for evenness in shift position, using a multi-needle tool to voice in the spaces between string grooves. Sometimes a quick swipe of the sanding file diagonally across the left corner of the crown will help if that area is hard.
- Continue by voicing for evenness at mf and ff. Isolate the strings that stick out and voice directly through the crown using a single needle.
- Listen to how many volume levels can be achieved with a hammer.
- It is so easy to over-voice on a Steinway
- Do it well with the shift voicing and it will sound fine in the rest position. Do the shift position fits
- Begin by listening to each key in the shift position and marking harsh notes
- The needles used in Steinway Hall are about 1/8" long and five or six in a row on the end of the stick. Right at the top next to the string grooves, plunge it in from the back and roll it over the top. This is very quick.
- Calculate the depth. In the treble go in less than in the tenor.
- The shift voicing should be a tone color change but not a dramatic drop-off.
- Continue by voicing for evenness at mf through ff. Isolate offending strings and voice directly through crown with a single needle. With Steinways, this can be done right on the string line through the crown with a single needle as a substitute for sugar-coating.
- Find out which string is the problem.
- Build the tone from bass to treble, especially in the fifth octave. The treble should be the brightest.
- After voicing for evenness, clean-up shoeshine filing with 600 grit sandpaper to bring striking surface to a smooth finish
- Re-check voicing in normal and shift position to make sure it hasn't changed too much. Check for evenness.

- **Hammer adjustment**
  - Filing
    - Steve made some short curved paddle files for fine-adjusting the hammers.
    - Make a transparent plexiglass file with a thin strip of sandpaper that will do only one string at time.
    - Don't file the hammer to match three irregular strings, because when the shift pedal is used, they won't match.
    - Do about 10 strokes in each upper shoulder, about ¼" to 3/8" from the strike point, just off the string grooves
  - Needling
    - Make sure the hammer-string fit is good, because needling can actually change the fit.
    - This fit can be adjusted either by filing or with a single needle

        - In the hammer, play the hammer into check and then push the needle through the strings as the hammer is pushed into and held by the back check.
        - This type of voicing can last a year or so.
        - On the crown, the tips can be sugar-coated with short needles for extra color, but only if needed.
    - Steam
        - Steam is quick but not a tool of finesse
        - It works but is not predictable
        - Steam works great in institutional applications
        - Steam is ideal for extremely hard hammers
        - Steam can soften the hammers enough to get needles in
        - It doesn't always last and may need to be done periodically
        - Do not ever steam Steinway hammers
    - Alcohol and water
        - Longer lasting than steam: goes in deeper
        - Takes overnight to dry before testing
    - Dealing with a noisy front duplex scale
        - Do not weave string braiding cloth
        - Check the fit on the notes that are sizzling: probably not perfect. Careful string leveling and fitting of hammers to strings
        - Careful voicing for evenness, one string at a time
        - If all else fails, very selective and small muting of individual strings in the duplex to remove the unwanted noise, with a tiny piece of bushing cloth, which can be slid up and down the duplex to find the offending harmonic
        - Put a drop of white glue on the spot on the string. This will re-tune the string so it won't resonate at the same pitch.

- **Summary**
    - Good voicing changes your career. You can transform a piano by working with the tone quality. Your reputation will be enhanced. Tuning is the bread-and-butter of our business. To make a living, it is important to be a good-rate tuner. Voicing, however, opens doors that take you beyond the normal realm. Develop a dynamic range for the piano to be able to perform the way it was designed. Start by identifying the worst voicing problem in the piano, probably at the bass break. See if you can smooth it out.

    - To quickly change the tone of a piano, press the shift pedal and place a business card or your PTG membership card between the stop block and the action to move the hammers-to-strings slightly out of the string grooves. Although a little shift pedal is lost, the tone is made softer. This small difference is often enough, particularly because this change has been made to the entire keyboard. When the artist is done, the card can be pulled out and the piano is back to its original brightness.

Tools

- Sand files and sandpaper strips backed with tape
- Hammer tail support for needling to support 3-5 hammers
- Hammer tail support for gang filing (2x2 to support at least a whole section)
- Curved sand file
- Felt-stiffening solution such as 1:3 lacquer in acetone
- String hook
- String seating tool
- Vice grips or pliers modified for voicing
- 3-needle voicing tool
- 1-needle chopstick voicing tool
- Multi-needle Steinway shift voicer
- Sugar coater
- Chalk
- Hammer felt scrap
- #5, #6 needles
- Carbon paper

Optional tools:

- Alcohol & water
- Steam pot